



# Emergency Groundwater Permit Workshop

- ◆ Drought response objectives & how emergency wells fit into the strategy -- Bob
  - ◆ Hydrogeologic Considerations – Ron and Anna
  - ◆ Mitigation Strategy - Bob
  - ◆ Typical Permit Conditions - Phil
  - ◆ Q & A and individual assistance
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- A stylized, dark teal silhouette of a mountain range is positioned in the bottom right corner of the slide, partially overlapping the text area.

# Drought Response Strategy

- ◆ Attempt to meet essential needs
  - Supplement severely pro-rated districts
  - 80% of a full supply
  - Conservation where possible
- ◆ Transfers of existing rights
- ◆ Emergency Ground Water Permits
- ◆ Mitigate where possible
- ◆ Acquisitions for fish

# Emergency Transfers and Ground Water Withdrawals – RCW 43.83.410

- ◆ Authorized for period no longer than drought declaration
  - ◆ Existing beneficial use that cannot be achieved with existing water right
  - ◆ Will not reduce essential minimum flows and must protect federal and state interests
  - ◆ Expedite processing – 15 days and no public notice
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- A stylized, layered mountain range graphic in shades of teal and blue, located in the bottom right corner of the slide.

# **Decision Considerations:**

## **Impairment Evaluations**

Well Interference

Aquifer Conditions

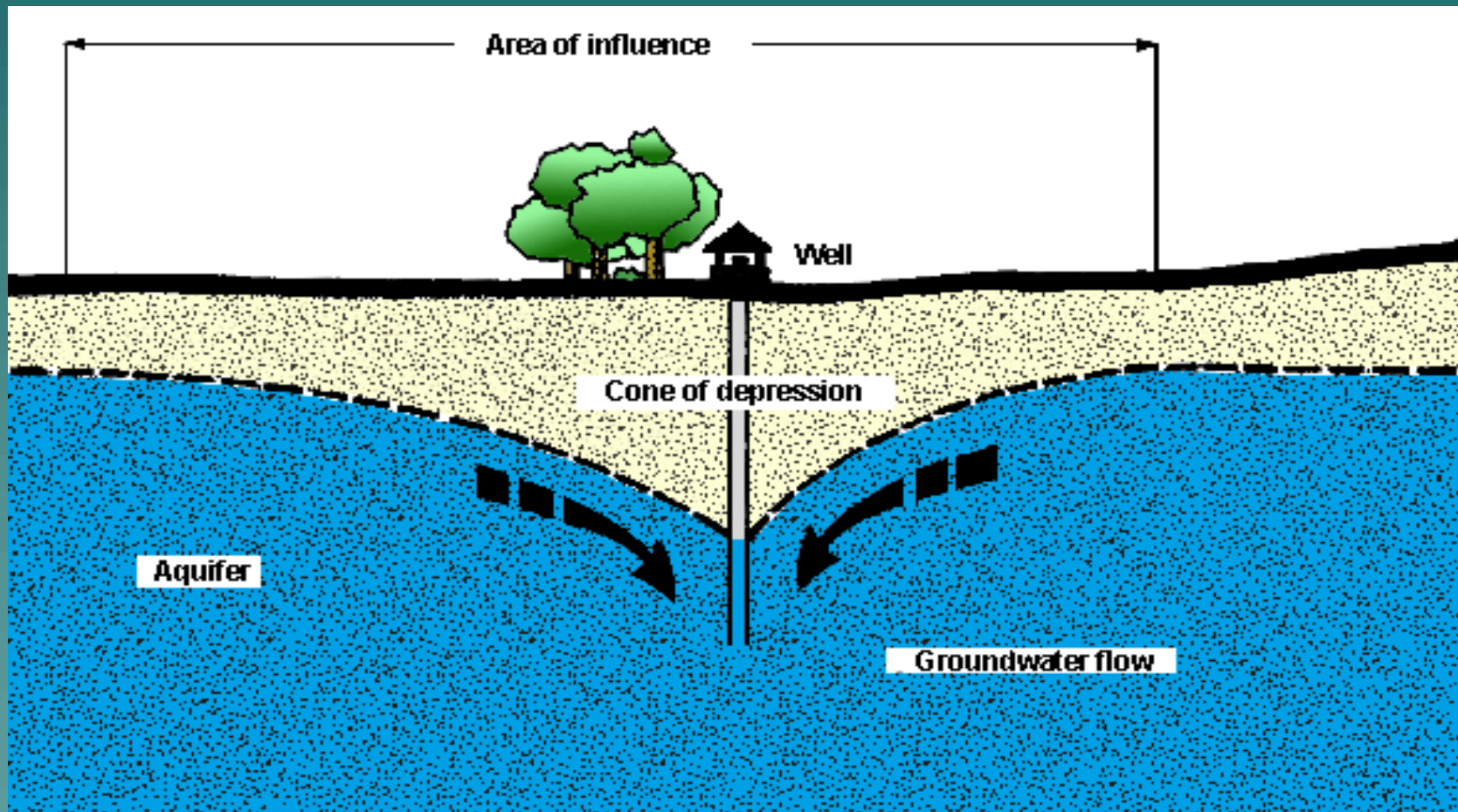
Ground Water Pumping Effects On Surface  
Water

# Well Interference

When evaluating water right applications for drought or otherwise, the question of how a proposed well will effect other existing wells must be answered

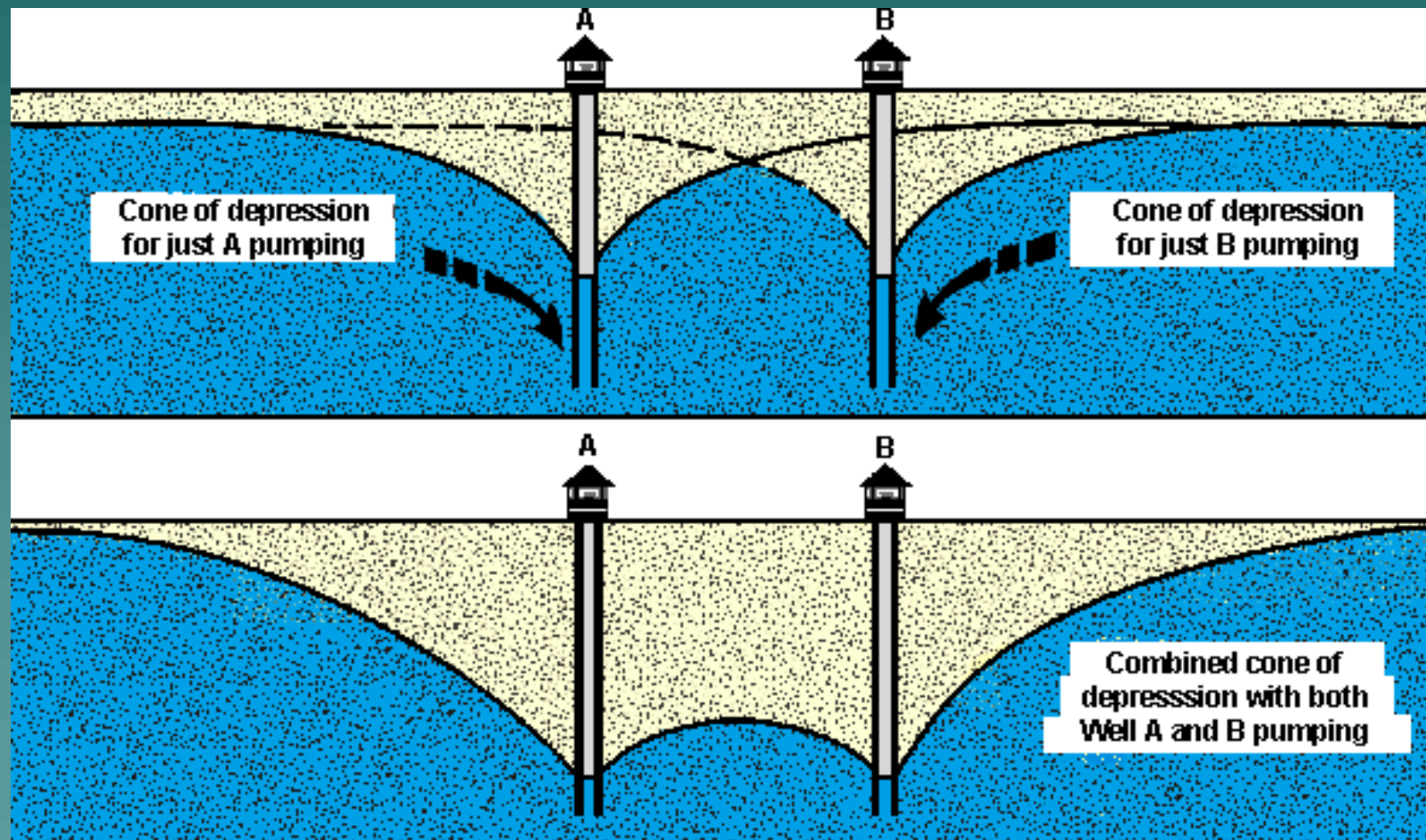
## Cone of Depression

Pumping from a well lowers the water surface near the well as ground water flows toward the well. The land area above the Cone of Depression is called the Area of Influence

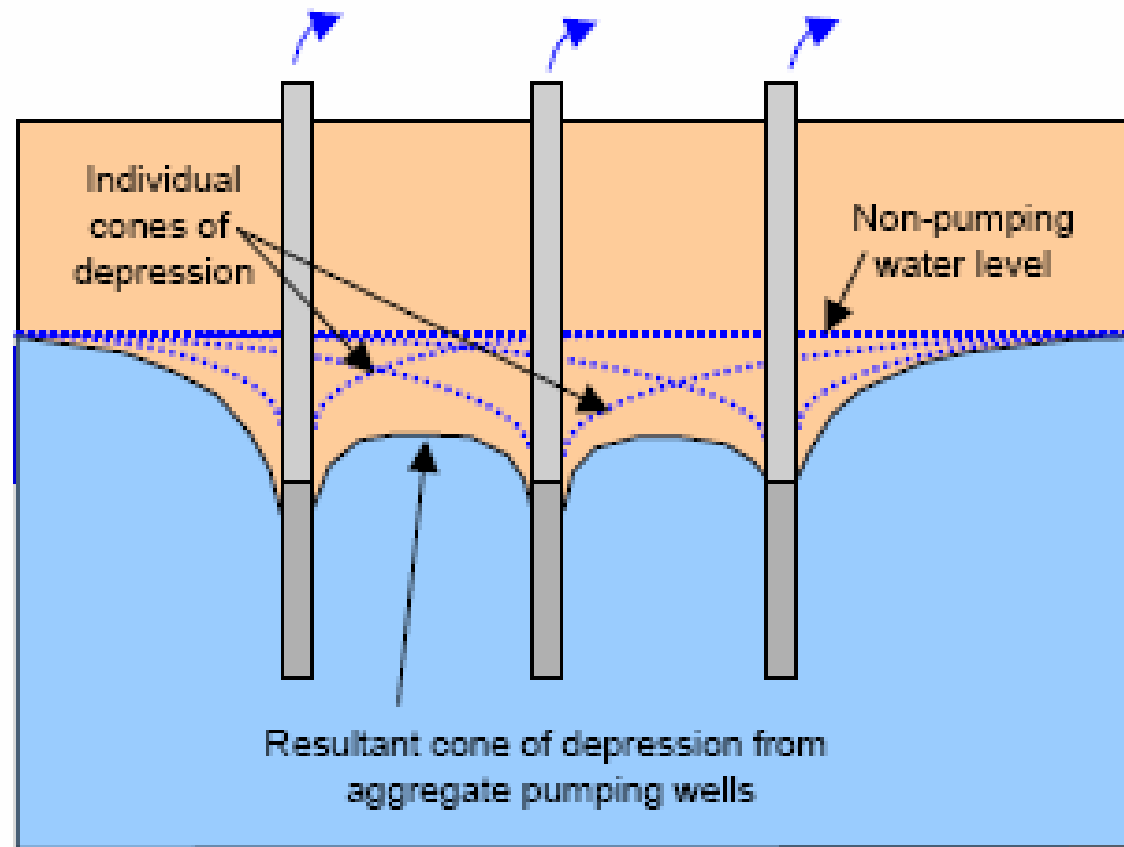




Well interference occurs when the cone of depression from two or more wells overlap. Well interference reduces the water available to the wells




# Well Field Interference





# Typical Well Interference Question

- ◆ A property owner submits an application to drill a 500 gpm irrigation well into a confined aquifer.
  - ◆ The proposed location for the well is 2000 ft. from an existing domestic water well drilled into the same aquifer.
  - ◆ Before a permit is authorized, technical staff evaluates what effect the new well will have on the existing well if it is added to the same aquifer.
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- A stylized, dark teal silhouette of a mountain range is positioned in the bottom right corner of the slide, partially overlapping the text area.

Technical staff draws information and data from:

Field Investigations

Well Logs

Geologic Maps

Geologic Reports

Topographic Maps

Cross Sections

Pump Tests

Specific Capacity Data

Literature

Inverse Modeling

Best Professional Judgment

Etc

A stylized, dark teal silhouette of a mountain range is located in the bottom right corner of the slide, partially overlapping the text 'Etc'.

The information and data allow technical staff to characterize the aquifer and estimate well field interference using the Theis equation

Theis described drawdown around a discharging, fully penetrating well in a homogeneous, confined aquifer as:

$$S(r,t) = (Q/4\pi T)W(u)$$

Where

$s(r,t)$  = drawdown

$Q$  = constant discharge rate (gpd)

$T$  = Transmissivity (gpd/ft)

$W(u)$  = Theis well function (exponential integral)

$$U = 1.87r^2 S/(Tt)$$

$r$  = distance from center of well to point of intersection (ft)

$S$  = storage coefficient

$t$  = time (days)

In the case described, Theis predicts  
drawdown at the domestic well, due to  
pumping at the irrigation well,  
would be approximately  
31 feet after 3 months of pumping at the  
irrigation well.


But.... Is this Impairment?

A stylized, dark teal silhouette of a mountain range is positioned in the bottom right corner of the slide, partially overlapping the teal background.

# Need to consider such things as:

- ◆ is the affected well a qualifying works
  - is the affected well constructed with reasonable aquifer penetration, etc.
- ◆ total aquifer thickness or hydraulic head available (how many feet of water above the water bearing zone or zones)
- ◆ available head and seasonal variations
- ◆ other pertinent information

To conservatively and cautiously characterize and estimate the effect as a result of pumping at the irrigation well.

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If a conservative and cautious evaluation suggest the closest well affected would be able to exercise its right with a fully qualifying works, then the effects would not be considered impairment.

If, however, the effect appears to approach “impairment”, then staff would further evaluate under what provisions, such as better well spacing, a well might be approved.

If provisions cannot be met, then an application may be denied based on impairment.

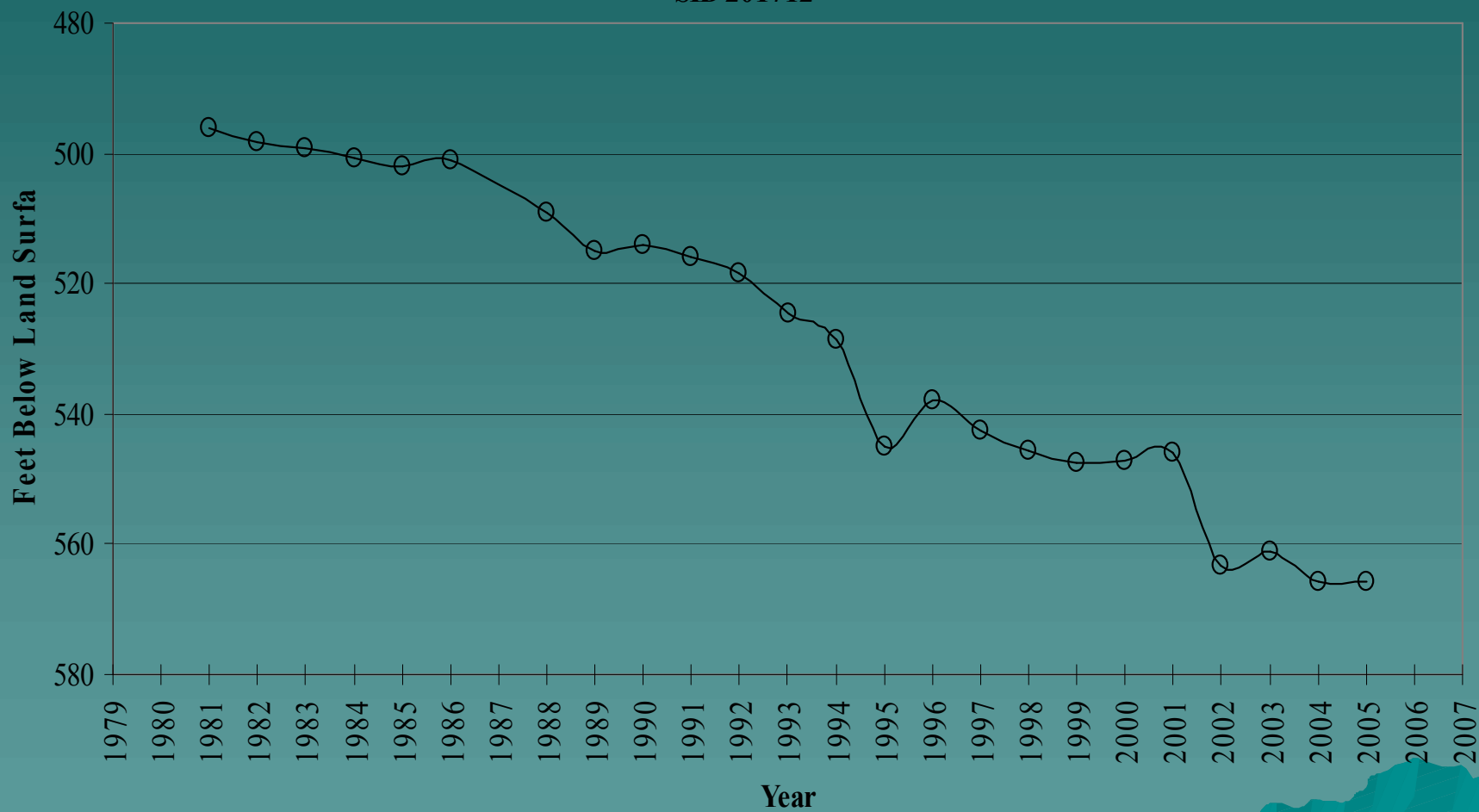


# Aquifer Conditions

When evaluating water right applications for drought or otherwise, aquifer conditions must also be considered in the decision process

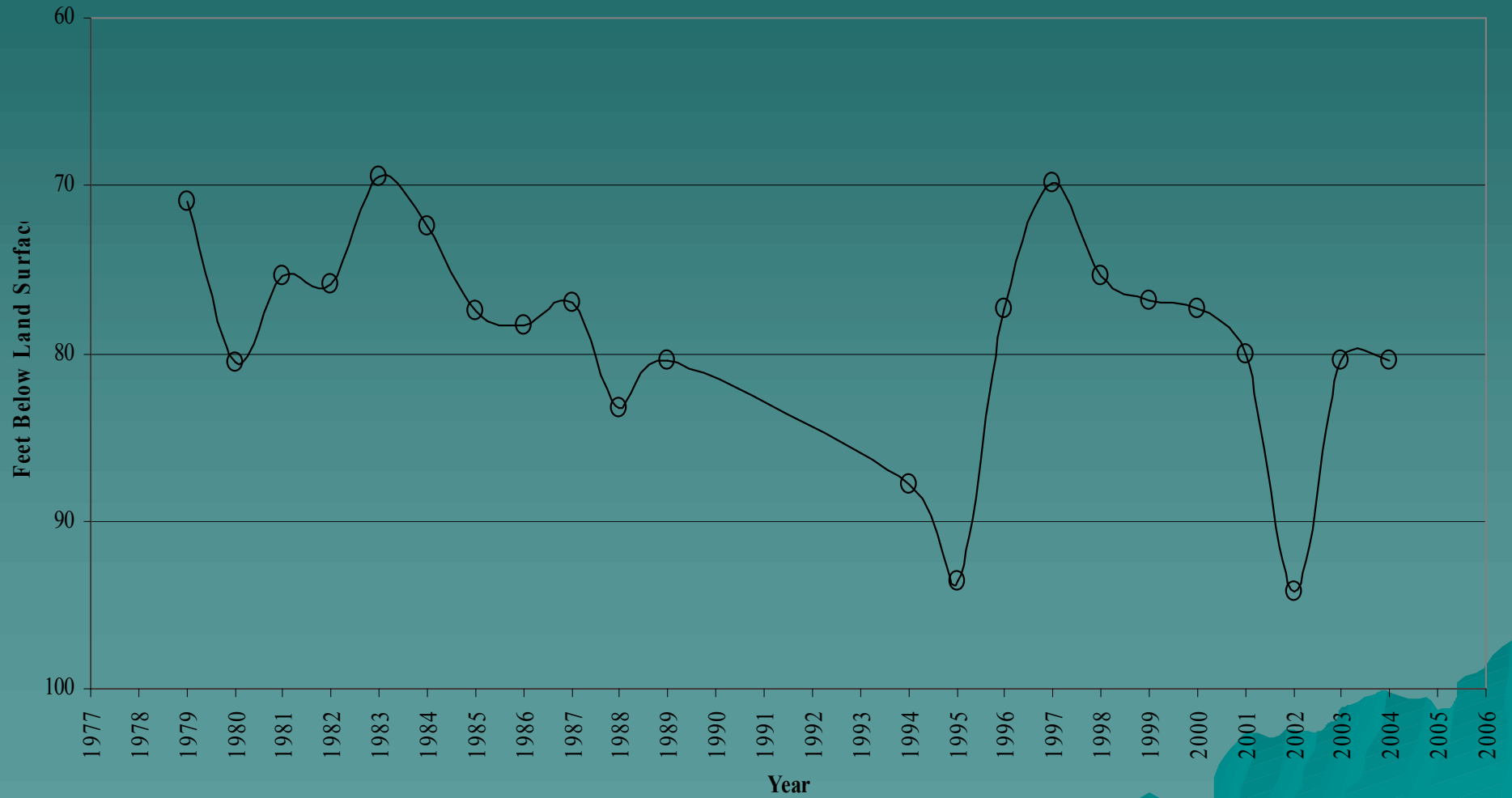


White Well  
T10/R23E-36G2  
Wanupum Aquifer  
SID 201712



—○— Spring Water Level Measurements


USGS Badger Pocket Well  
T17/R20E-29R1  
Ellensburg Aquifer  
SID 211040



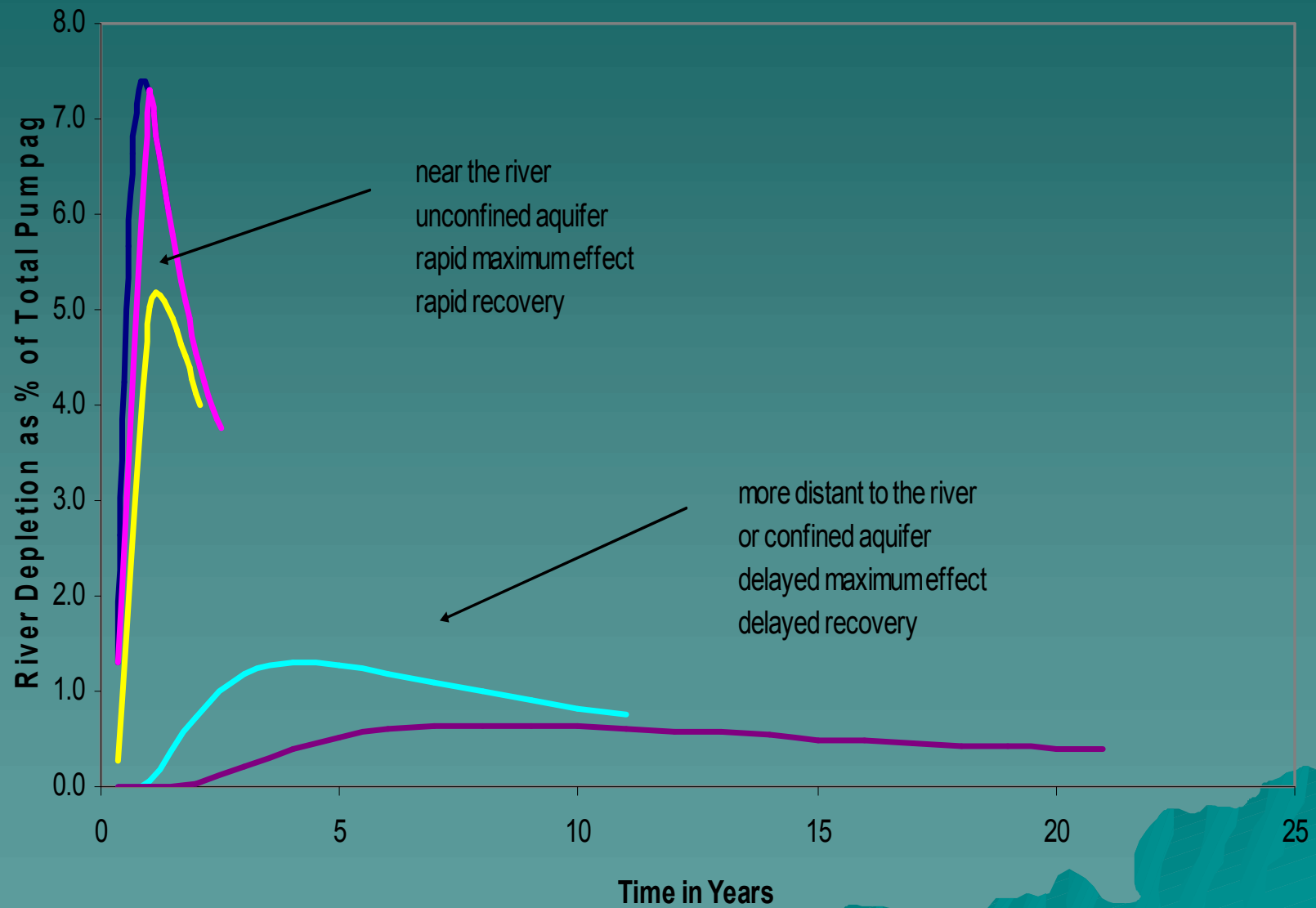
—○— Spring Water Level Measurements

# Surface Water

When evaluating water right applications for drought or otherwise, the effects of ground water pumping on surface water must be considered in the decision process

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River Depletion Rate: Magnitude and Timing  
Variation with Distance  
Variation with Confinement



# Mitigation Strategy

- ◆ Short-term impacts
  - Use 2005 water right leases to mitigate adverse effects from transfers
- ◆ Long-term impacts
  - Use water right acquisitions to mitigate adverse effects due to ground water pumping under emergency authorizations

# How Much Water Can Be Authorized?

- ◆ Conservation Expected (20%)
- ◆ Target is 80% of “Normal Water Duty”
  - Roza = 3.3 feet typical
  - KID = 3.5 feet typical
  - KRD = 4 feet typical
- ◆ March Forecast for “pro-ratables” was 34% assuming “normal” precipitation in the spring



# Roza Example

20% Conservation = 0.66 feet

**3.3 feet**

**2.66 feet**

Ecology Drought Authorization  
= 1.8 feet

**0.84 feet**

Roza Supply = 0.84 feet\*

\*Assumes 25% Supply from Roza



# New wells?

- ◆ Think about your alternatives...
  - Share a nearby supplemental well or previously constructed drought well?
  - Good year to change to a new crop?
- ◆ The downside of a new well...
  - Drilling industry insufficient to complete many wells in time to help
  - Typical drought well is costly

# The Application Process

- ◆ File New Water Right Application
- ◆ Read and sign supplemental form
- ◆ We will ask for additional information
  - What crops
  - How many acres of each crop

# Additional Information

- ◆ Maps of your farm
- ◆ Aerial photos
- ◆ Well location(s) on a map
- ◆ Indicate whether you were issued a drought permit in 2001
- ◆ How you measure water
  - Flow meter
  - Power readings